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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Vlad Mitlin

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EXAMINER

WARE, CICELY Q

ART UNIT	PAPER NUMBER
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2634

DATE MAILED: 02/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/865,763

Applicant(s)

MITLIN, VLAD

Examiner

Cicely Ware

Art Unit

2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 28 November 2005.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-42 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1,2,8-10,12,18-20 and 22-24 is/are rejected.  
7) ☒ Claim(s) 3-7,11,13-17,21 and 25-42 is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)  
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_.  
5) ☐ Notice of Informal Patent Application (PTO-152)  
6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Response to Arguments*

1. Applicant's arguments, see **REMARKS**, filed 11/28/2005 with respect to the rejection(s) of claim(s) 1, 2, 10, 12, 18, 19, 20, 22, 23, 24 under 35 USC 102(e) and 9 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Tanner (US Patent 4,882,733).

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1, 2, 8, 10, 12, 18, 19, 20, 22, 23, 24 rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. (US Patent 6,888,789) in view of Tanner (US Patent 4,882,733).

(1) With regard to claim 1, Sakoda et al. discloses a method of selecting a bit load per sub-channel in a multicarrier system, the multicarrier system encoding data based on a constellation of points, each point representing a tuple of data, the constellation having a self-similarity property (col. 15, lines 60-67 – col. 16, lines 1-15).

However Sakoda et al. does not disclose in selecting the bit load per sub-channel based on the self-similarity property of the constellation.

However Tanner discloses in (Figs. 3 and 4) selecting the bit load per sub-channel based on the self-similarity property of the constellation (col. 1, lines 46-68, col. 2, lines 3-15, 48-68 – col. 3, lines 1-3, col. 15, lines 11-68 – col. 16, lines 1-68, col. 17, lines 1-25, 65-68 – col. 18, lines 1-17).

Therefore it would have been obvious to one of ordinary skill in the art to modify Sakoda et al. in view of Tanner to incorporate selecting the bit load per sub-channel based on the self-similarity property of the constellation in order to maintain the separations between different messages (Tanner, col. 2, lines 3-4).

(2) With regard to claim 2, claim 2 inherits all the limitations of claim 1. Tanner further discloses determining a probability of having bit errors in an erroneous tuple based on the self-similarity property of the constellation (col. 4, lines 19-47, 48-68 – col. 3, lines 1-3, col. 15, lines 11-68 – col. 16, lines 1-68, col. 17, lines 1-25, 65-68 – col. 18, lines 1-17).

(3) With regard to claim 8, claim 8 inherits all the limitations of claim 1. Sakoda et al. discloses in (Figs. 8 and 9) wherein said constellation is square.

(4) With regard to claim 10, claim 10 inherits all the limitations of claim 1. Tanner further discloses in determining a mean square deviation of the number of bit errors in an erroneous tuple; wherein said selecting further comprises selecting the bit load per sub-channel based on said mean square deviation of the number of bit errors in a erroneous tuple (col. 2, lines 3-15, col. 3, lines 7-20, col. 7, lines 8-22).

Tanner does not explicitly disclose mean square deviation. However it is well known in the art that in probability and statistics, the standard deviation is the most

commonly used measure of statistical dispersion. Simply put, it measures how spread out the values in a data set are. The standard deviation is defined as the square root of the variance. This means it is the root mean square (RMS) deviation from the average.

(5) With regard to claim 12, claim 12 inherits all the limitations of claim 10.

Sakoda et al. further discloses in (Figs. 8 and 9) wherein at large values of the mean square deviation of the number of bit errors in an erroneous tuple tends to the square root of two (col. 16, lines 1-36).

(6) With regard to claim 18, claim 18, claim 18 inherits all the limitations of claim 1. Sakoda et al. discloses wherein a parameter having said self-similarity property is a Hamming distance of the points of the constellation (col. 16, lines 1-15).

(7) With regard to claim 19, see rejection of claim 1.

(8) With regard to claim 20, claim 20 inherits all the limitations of claim 19. See rejection of claim 10.

(9) With regard to claim 22, claim 22 inherits all the limitations of claim 19. See rejection of claim 18.

(10) With regard to claim 23, see rejection of claim 1.

(11) With regard to claim 24, claim 24 inherits all the limitations of claim 23. See rejection of claim 20.

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sakoda et al. (US Patent 6,888,789) in view of Tanner (US Patent 4882733), as applied to claim 1.

With regard to claim 9, claim 9 inherits all the limitations of claim 1. Sakoda et al. in combination with Tanner do not disclose wherein the constellation is non-square.

However it is well known in the art that the shape of the constellation does not affect the self-similarity property. Therefore claim 9 is not patentable.

#### **Allowable Subject Matter**

6. Claims 3-7, 11, 13-17, 21, 25-42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter: The instant application discloses a method of selecting a bit load per sub-channel in a multi-carrier system. Prior art references show similar methods but fail to teach: **“determining an average number of bit errors in an erroneous tuple based on said probability and selecting is also based on the average number of bit errors in the erroneous tuple”**, as in claim 3; **“wherein said average number of bit errors in the erroneous tuple is determined as  $w(b) = 12(2^b) - (3b+2)2^{b/2} - 2b - 4/6b(2^b)$ ”**, as in claims 4; **“the probability  $p(k,b)$ ”**, as in claims 5, 29; **“the probability  $p(k,b)$  is determined”**, as in

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claims 6, 30; **“wherein said probability approaches  $1/2^k$  for constellations which have large values of  $b$ ”, as in claims 7, 31; “wherein said mean squared deviation of the number of bit errors in an erroneous tuple is determined based on the relationship as in claims 11, 35”; “wherein at large values of  $b$ , the mean square deviation of the number of bit errors in an erroneous tuple tends to be the square root of two”, as in claim 36; “access in a table of associated values of the number of bits and the values of the mean square deviation of the number of bit errors in an erroneous tuple to retrieve a value of a particular mean square deviation of the number of bit errors in an erroneous tuple for a particular value of  $b$ ”, as in claims 13, 37; “selecting at least one forward error correction parameter based on said adjusted target bit error rate”, as in claims 14, 38; “determining a probability of having  $k$  bit errors in an erroneously decoded tuple”, as in claims 15, 39; “wherein said constellation is non-square, and said probability of having bit errors in an erroneously decoded tuple of the non-square constellation is estimated as if said non-square constellation was a square constellation”, as in claim 16; “wherein said constellation is non-square, and said probability of error of said non-square constellation become asymptotically close to the probability of error of a squared constellation encoder”, as in claim 17; “determining a probability of having  $k$  bit errors in a  $n$  erroneously decoded tuple based on the self-similarity property of the constellation, wherein said probability of having  $k$  bit errors in an erroneously decoded tuple of the non-square constellation is estimated as if said non-square constellation was a square constellation”, as in claims 21 and 25; “means for**

**determining a bit load per sub-channel based on the self-similarity property of the constellation based on forward error correction parameters; means for determining a coding gain base on said determined bit load, and forward error correction parameters; and means for selecting a bit load based on the coding gain”, as in claim 26; “means for determining a probability of having bit errors in an erroneous tuple based on the self-similarity property of the constellation”, as in claim 27; “determining an average number of bit errors in an erroneous tuple based on said probability and selecting is also based on the average number of bit errors in the erroneous tuple”, as in claim 28; “wherein said constellation is square”, as in claim 32; “wherein the constellation is non-square”, as in claim 33; “determining a mean square deviation of the number of bit errors in an erroneous tuple; wherein said selecting further comprises selecting the bit load per sub-channel based on said mean square deviation of the number of bit errors in a erroneous tuple”, as in claim 34; “wherein said constellation is non-square, and said probability of having bit errors in an erroneously decoded tuple of the non-square constellation is estimated as if said non-square constellation was a square constellation”, as in claim 40; “wherein said constellation is non-square, and said probability of error of said non-square constellation becomes asymptotically close to the probability of error of a squared constellation encoder”, as in claim 41; “wherein a parameter having said self-similarity property is a Hamming distance of the points of the constellation”, as in claim 42.**



***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cicely Ware whose telephone number is 571-272-3047. The examiner can normally be reached on Monday – Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 571-272-3056. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9314 for regular communications and 703-872-9314 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

*Cicely Ware*

cqw  
February 6, 2006

  
CHIEH M. FAN  
SUPERVISORY PATENT EXAMINER